

## **Flooding in Houston: Learning from the Past and Planning for the Future**

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### **INTRODUCTION**

I have lived in Houston for over 20 years and have experienced many floods, ranging from very limited local floods that lasted a few hours and resulted in minimal damage, to major floods that have lasted for several days and resulted in billions of dollars in damage. I have observed our usually docile bayous and streams turn into what seemed to be “raging rivers.” I once rode in a Metro bus, passing dozens of stranded automobiles along one of our bayous. Even though sitting high above most of the other vehicles, we were barely able to trudge through water that reached far too high on the sides of the bus.

I also remember an occasion when I had barely arrived at work in my old truck before a major storm pounded our area. When I left home (about eight miles away), there was only a hint of misty rain and even a few bright rays of sunlight, but by the time I approached the school’s parking lot, the rain was pounding on my roof, the winds were blowing my truck and the trees to and fro, and the skies were as dark as midnight. A co-worker, however, was attempting to arrive in her dreamy new sports car about ten minutes later and had to abandon it (because water had risen in it up to the top of her seat) less than a block away from our school. Her eyes still cloud with tears when anyone mentions that car, but nobody questions why she now drives some kind of SUV. Throughout the day we were only allowed to release students to the very few parents who were able to drive or walk into our school’s heavily flooded drive and grounds, leaving almost all of the students at school well after the bells rang for dismissal. Quite luckily, there was a break in the storm about thirty minutes later, and most of the students and teachers were able to escape before another round of even more extensive flooding occurred. A few students and brave teacher volunteers, unfortunately, had to remain at school until late that night. Fortunately, the merciless rains and winds finally subsided during the night, and our drainage system cleared most of the flooding before the next beautiful Texas sunrise.

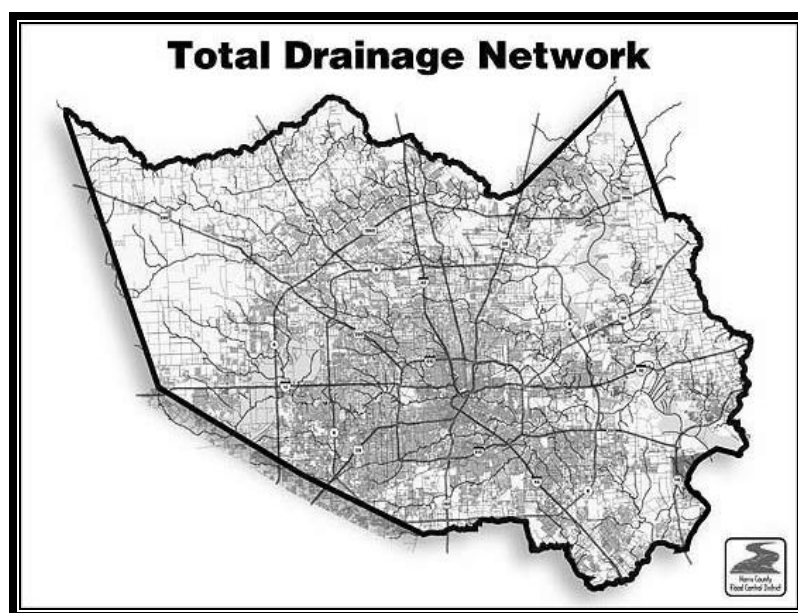
I have finally come to the conclusion that the best way to deal with flooding is to stay off the roadways and wait for the drainage system to have time to work.

In my opinion, chanting “Rain, rain, go away” is still better than struggling with the snowy, icy days that I had faced in Ohio before moving to Texas! And not to even mention the sub-freezing days that led to all of the roadways being closed to all but emergency vehicles and trying to enjoy the short blasts of lukewarm air that the furnace struggled to provide! On one miserable icy day, I very intentionally pulled off the road well before arriving at the bottom of a fairly steep hill and waited for a school bus to move behind a salt truck that was inching up the hill. Still, the bus slid all the way down the hill and much farther, swerved off the road, and still managed to crash into my car! After giving me a rather strange card that guaranteed that my car would be repaired at school district expense (at least they were well-prepared), both of our vehicles were very easily able to drive up that hill! I turned left with my poor, aching car and headed for the body shop, while that undamaged “tank” turned right and headed for its next adventure. Luckily, I was unharmed except for my spirit and the school bus driver was fine. The genius teacher who once told me, “Almost all accidents can and should be prevented,” needs to hear from me, even though I still insist on telling my own students the same thing!

Most of our young students have never experienced a real snowfall, except for perhaps the very rare and minimal snow that we experienced on Christmas Eve of 2004 that melted almost as quickly as it had fallen. It is a sure bet, however, that ALL of them will experience major flooding throughout their lives if they remain in Houston!

## UNIT BACKGROUND

Geological hazards affect all areas of our planet to some extent. Our local students (those enrolled in the Houston ISD, for example) and other residents of our nation's fourth largest city need to be prepared to face the occasional mild, moderate, and heavy flooding that may result from tropical storms, hurricanes, thunderstorms, and other events that produce various amounts of rainfall. The flat landscape, low elevation and location of Houston on the Gulf coastal plain near the Gulf of Mexico, make Houston very vulnerable to flooding. According to the Harris County Flood Control District (2005), the extensive draining system (including approximately 2,500 miles of manmade streams and natural stream channels) helps the area avoid flooding in "normal" situations. Heavy rainfall or extended periods of rainfall, however, continue to provide flooding (Harris County Flood Control District). The following map (from the Harris County Flood Control District) shows the drainage basin:



*Figure 1: Major streams and bayous in Harris County  
(Harris County Flood Control District)*

My students definitely need to be interested in studying about floods and other geological hazards since their lives and property are at risk! Many of them remember the results of Tropical Storm Allison in June of 2001. Tropical Storm Allison poured record rainfall on Houston and East Texas during the period that included June 1-5, 2001. Almost 37 inches of rain was recorded at the Houston Ship Channel. Allison also caused the costliest flood in U.S. history, with damages of approximately \$5 billion in Harris County (the county that contains most of Houston and its major suburbs). While 22 lives were lost due to Tropical Storm Allison, 21 lives were lost due to Hurricane Alicia in 1983, but the economic damage from Allison was at least double the damage from Alicia.

Many students also remember seeing multimedia coverage of the three major hurricanes that ravaged Florida during the 2004 hurricane season. Any one of those could have hammered into our area, but we were very fortunate. Texas Governor Perry and several other officials frequently

remind us that it is not a question of “if” a hurricane will hit Southeast Texas; it is a question of “when” that will occur (“Texas Coast Prepares for Hurricane Season”). Since the area has not experienced a major hurricane in many years (Hurricane Alicia in 1983 was the most recent local occurrence), we are considered to be in a period of “hurricane drought” that officials, such as Governor Perry, expect to end very shortly.

Although students of any age can benefit from studying about floods and other geological hazards, the students that I address are at an ideal age for the activities that are presented in this project. The students to be addressed (grades 3-5) need hands-on experiences and exposure to various types of media resources.

It is important to teach this topic because, even though we cannot control floods, we can help be better prepared to face their consequences. By learning about the risks involved with flooding, the students can be aware of the need to lower the risk of loss of life and damage by choosing to reside outside the flood plains and how to attempt to be prepared to face the inevitable floods. They can also be informed citizens when the issues involved in flood control projects are presented to voters and various agencies for approval or discussion

Specifically, students need to associate human activities related to the consequences of periods when the probability of rain is high. They need to be aware of the most vulnerable areas that are delineated on flood plain maps. The Harris County Flood Control District provides extensive information about flood preparedness, the need for flood insurance, the major flood control projects that are in progress throughout Harris County, and photographs of Harris County’s vast drainage system. Residents can use the FEMA Preliminary Flood Insurance Rate Map Lookups and the Interactive Mapping Tools to determine the risk of flooding throughout the area.

In addition, students need to determine how building affects flooding. The probability and risks of flooding are increasing in some areas, while the risks are projected to decrease, according to the Harris County Flood Control District, in others.

Storm water detention and retention are two important elements of flood control that students need to be able to identify. Detention basins have been built throughout Harris County by the government and private developers for temporary, short-term storage of excess storm water. Retention basins, in which storm water is to be stored indefinitely, are very uncommon in Harris County. Many of the detention and retention basins have additional daily uses in terms of recreation and beautification

One of the newer storm water detention basins, Willow Waterhole, serves as an excellent example of how basins can be fabulous green spaces for community use, as well as effective tools for flood control. A recent issue of a local newspaper (Contreras 24), details how community groups are partnering with government agencies (e.g. the Harris County Flood Control District) to raise money to enable basins to serve these dual roles. Fishing, boating, hiking, biking, picnicking, and various other activities can occur in these areas, and these areas also serve as important wildlife habitats in the inner city. Since the Willow Waterhole can hold over 600 million gallons of water and has over 280 acres of green space, this project can also serve as a model for future projects.

## **CONCLUSION**

Flooding is Houston’s very challenging geologic hazard. In addition to the moderate to heavy rainfall that provides occasional flooding that is generally tolerable, our area is also threatened by tropical storms, hurricanes, and other disturbances that can be very devastating. Although we can’t prevent these events, we can help our students and their families be better prepared to face

these and other emergency situations. By learning from the lessons provided by the past, we are better prepared to plan for the future.

Instead of being mystified by the extensive drainage system that our community must maintain and improve, our citizens need to understand how it has been designed to provide relief during flooding. In addition to assisting with flooding, a large portion of our drainage system provides beautification and recreation. The huge drainage system also serves as a habitat for wildlife.

This interdisciplinary unit serves as a structure for addressing several learning objectives (TEKS), provides opportunities for students to make choices about their learning, and provides many opportunities for students to share their learning with fellow students and their families. It is my hope that by teaching it to my students, they will be better informed in terms of dealing with emergency situations (in addition to flooding), more skilled in using technology to enhance and present their learning, and more eager to propose questions and search for answers by using research and problem-solving skills.

### **IMPLEMENTATION STRATEGIES**

This unit will be used with students in our Science Club, a third-fifth grade enrichment group that meets on Thursday afternoons from 3:00-4:00 P.M. (occasionally meeting until 5:00 due to special events), for approximately one semester. After a multimedia overview of flooding that the teacher has prepared and examination of print and Internet resources, the students (in small groups of 2-3 students) will determine specific topics related to flooding that they desire to explore. In anticipation that most of the groups will not be able to determine specific topics without assistance, I will relate math (a major tool for scientists as well as a science of its own) by showing them how to compute measures of central tendency (an objective addressed by TEKS) by using actual rainfall data for Texas. As another example, I will show them a collection of print and electronic media (such as from the *Houston Chronicle* and various web sites) that tell about how to prepare for hurricanes and other severe weather occurrences.

Grocery store chains, in cooperation with television stations, provide hurricane and flood guides as a community service. For example, Houston's ABC 13 provides a *Hurricane Tracking Map* and considerable related information on an annual basis, as does Houston's NBC 2 with the *Hurricane and Flood Survival Guide*. These items are provided as newspaper supplements and are available at their grocery store sponsors. Although such resources contain considerable advertising, they are also free resources that contain valuable information. Teachers can obtain class sets and utilize these materials in their classrooms.

Before my students use the materials listed above, they will then be challenged to make a personal plan with lists of items (including approximate prices and sources) that they will need to have available, possible/probable challenges that they must face during and after the event, and even relate this information to historical events. They will then compare their lists with the ones listed in the resources.

Another interesting topic for students to explore would involve interviewing adults who have actually experienced flooding. The students would have to prepare questions, obtain pre-approval, and conduct the interviews – ideally with a video camera. In order to obtain information from different perspectives, several adults would need to be interviewed.

In terms of providing meaningful background experiences for all of the students, hands-on experiments will also be included within the sessions. For example, the students will experiment with soil erosion by using models that they construct in small groups. The groups will construct models with good and poor erosion controls. The students will also do water sampling by examining simulated pollution runoff.

The students will use the school's computer lab to gather information (through activities that have been carefully constructed by the teacher) and to present showcases of their learning. Digital cameras, scanners, digital video cameras, and programs such as PowerPoint will be utilized. Simple movie production software will also be utilized. Although the TEKS objectives related to flooding will be addressed, the students will also use the TEKS Technology objectives to reflect their learning.

In summary, this very important curriculum unit will attempt to find some possible answers to the following questions (fully realizing that ALL of these questions cannot be reasonably addressed within the framework of this project): 1) What are the major causes of flooding in Harris County? 2) What efforts are being made to lower the risks of flooding and to respond to flooding when it does occur? 3) How does building (construction) affect flooding? 4) How can flooding be examined in a historical perspective? 5) How can we learn from the past in order to plan for the future? Our students of today will be tomorrow's leaders, so it is wise to start preparing them to face the challenges that they must face in the present as well as those that lie ahead.

### **OBJECTIVES ADDRESSED**

The following Texas Essential Knowledge and Skills (TEKS) are addressed in this unit of instruction:

- 126.3 (b) (5) Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision.
- 126.3 (b) (4) Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision.
- 110.6 (b) (12) (I) find similarities and differences across texts such as in treatment, scope, or organization (4-8)
- 110.6 (b) (12) (L) represent text information in different ways such as in outline, timeline, or graphic organizer (4-8)
- 110.6 (b) (13) (C) use multiple sources, including print resources, to locate information and organize information (4-8)
- 110.6 (b) (13) (D) interpret and use graphic sources of information such as maps, graphs, timelines, tables, and diagrams to address research questions (4-8)
- 110.6 (b) (13) (F) produce research projects and reports in effective formats using visuals to support meaning, as appropriate (4-5)
- 110.6 (b) (25) (B) produce communications using technology or appropriate media such as developing a class newspaper, multimedia report, or video reports (4-8)
- 112.5 (b) (3) (C) represent the natural world using models and identify their limitations
- 112.5 (b) (10) (A) identify and observe effects of events that require time for changes to be noticeable including growth, erosion, dissolving, weathering, and flow
- 111.17 (b) (4) (A) round whole numbers and decimals through tenths to approximate reasonable results in situations
- 111.17 (b) (13) (B) describe characteristics of data presented in tables and graphs including the shape and spread of the data and the middle numbers

- 113.7 (8) (b) (D) explain the geographic factors that influence patterns of settlement and the distribution of populations in the United States, past and present
- 113.7 (9) (b) (C) analyze the consequences of human modifications of the environment in the United States, past and present
- 115.6 (b) (4) (E) explain how to develop a home-safety and emergency response plan such as fire safety

## LESSON PLANS

### Lesson One – Introduction and Learning from the Past

This lesson, which will take approximately three class sessions to complete, will serve as an introduction to our study of flooding in Houston. Segments of videos of Tropical Storm Allison will be shown to emphasize the severity of major weather events in Houston. Information from other historical events of the past (such as the Galveston hurricane of 1900) will also be shared. The teacher will share an introductory PowerPoint presentation to present photographs and related information. The students will then use special pages in our school’s web site to access information by following a series of specific links.

An article in the *Houston Chronicle* (November 16, 1930) discussed the 1915 hurricane’s impact on Houston, stating that if this hurricane had shifted its course even 40 miles westward, Houston would have experienced the “super-flood.” The article also discussed the horrible flood that did occur in April of 1929 and warned that Houston is in constant fear of the “super-flood.” When the horrible flood of December 7-10, 1935, arrived, calls became very loud for the creation of the Harris County Flood Control District. “Wild River: a Pictorial Petition” was presented to the Texas State Legislature on March 4, 1937, and the Harris County Flood Control District was created by Senate Bill 114 and House Bill 234. “Wild River” reported that the flood of 1929 in which five children and two adults drowned resulted in \$1,392,442.76 damages, while the flood of 1935 resulted in \$2,528,606.32 in damages. The web site of the Harris County Flood Control District ([www.hcfc.org](http://www.hcfc.org)) provides helpful pictures and extensive information for these and other floods.

Once students have explored some of the links, we will discuss their findings and impressions as a whole group.

### Lesson Two: Flooding Viewed from a Broader Perspective: Living with Rivers

Information gained from Dr. William R. Dupré’s lecture relating to the benefits obtained from living along rivers and the risks posed will be shared (Dupré). The students will be challenged to explain why cities need water (for example, Dr. Dupré explained that rivers and lakes provide over 78% of the water that we use in the United States). The students will use various maps (<http://www.lib.utexas.edu/maps/>) to locate major cities throughout the United States and the world and note that they are located on major rivers and other bodies of water. Although rivers are beautiful and enormously beneficial to mankind, rivers can also flood and cause major destruction.

I will demonstrate how to do Internet searches to obtain information about the Mississippi River floods of 1993, one of the worst incidences of river flooding in the United States in recent years, and flooding of several rivers in Texas. Time will then be provided for the students to locate additional information about some of the river floods that have occurred in Texas and other areas of the United States. The students will report their findings to the class.

### **Lesson Three: How to Access and Utilize Real Time Water Flow Data**

I will demonstrate how real-time water flow obtained from the U.S. Geological Survey can be utilized to learn about Tropical Storm Allison. May 30, 2001-June 8, 2001 data will be explored. Monitoring points will be located on maps of Houston/Harris County (<<http://www.topozone.com>> and <<http://www.lib.utexas.edu/maps/texas.html>>). The students will immediately notice the consistently low water flow prior to Allison's arrival, followed by the three huge spikes related to the three major rainfall events during June 1-5, 2001. The students will then notice that the flow returned to its previous consistently low flows after the floodwaters had subsided.

During periods anticipated flooding, we will visit the real-time water flow site to monitor the changes that are occurring. We will compare the flows before, during, and after the flood.

### **Lesson 4: A Children's Literature Connection**

In this lesson the students will compare and contrast (by using Venn diagrams) two true stories about a very historic storm event in Maine in January of 1856. The students will read *Abbie against the Storm* and *Keep the Lights Burning, Abbie*. The students will locate Matinicus Rock, Maine, the location of the lighthouse featured in these books. They will then discuss the importance of lighthouses during the 19<sup>th</sup> century and parts of the early 20<sup>th</sup> century. As a culminating event, the students will view a "Reading Rainbow" video about this important event. The students will then write a composition after brainstorming to prepare a list of possible writing topics.

### **Lesson 5: Preparing for Flooding**

In this lesson the students will learn how to prepare for flooding -- particularly flooding that may result from hurricanes and tropical storms.

I will begin this lesson by asking students to make lists of items that their families will need to have available during periods of major flooding. After using the individual lists to compile a class list, we will compare our lists with those provided in various resources. For example, the students will utilize online resources (<<http://www.hcfd.org/famfloodprepare.html>> and <<http://www.fema.gov/hazards/floods>>) and preparation brochures/newspaper inserts that are sponsored by local grocery store chains in partnership with the local stations of the national television networks (Kroger/ABC, Randalls/CBS, and HEB/NBC). In small groups, they will compare and contrast the information and use it to prepare a draft flooding home-safety plan for their family. The groups will present their plans to the class for evaluation, and each student will then prepare an individual plan for his or her family. The students will then be challenged to present the plan to their family for discussion and consideration.

### **Lesson 6: Measures of Central Tendency**

The students will utilize actual data and related information from the Department of Meteorology at the University of Utah (<<http://www.met.utah.edu/jhorel/html/wx/climate/normrain.html>> and <<http://www.met.utah.edu/jhorel/html/wx/climate/daysrain.html>>) to identify measures of central tendency for precipitation in Houston. They will compute the average monthly precipitation for the year (rounding to the nearest tenth is recommended) and the average monthly days of precipitation with .01 inches or more, identify the median and mode, state the range, and perform various other computations with real data. After doing this "by hand," the students will use Excel to prepare spreadsheets for easy use.

### **Lesson 7: Digging-In – Hands-on Experiments for Students**

Students will learn about erosion and water pollution with various hands-on experiments (variations of "Stem the Tide," "A Plethora of Pollution," "Don't Rain on My Parade," and

several similar experiments from *365 More Simple Science Experiments* and *365 Simple Science Experiments*). The students will perform these investigations using everyday materials and then modify them if possible. The students will test water for pH, discover ways to help prevent erosion, and learn about how pollutants can contaminate storm water. Information about erosion can also be obtained at the United States Geological Survey's extensive web site (<http://www.usgs.gov>). Specific web pages (<http://coastal.er.usgs.gov/hurricanes/oblique.html>) show pictures of how North Carolina's Topsail Island has been eroded by three hurricanes that occurred during 1996-1998 and pictures of erosion caused by many other storms.

### **Lesson 8: The Johnstown, PA Flood of May 30, 1889**

After viewing a PowerPoint presentation about the Johnstown Flood (based largely on *The Johnstown Flood* by David McCullough) and reading about it (*America's Great Disasters*), the students will discuss some of the important lessons learned after the dam burst, resulting in the loss of over 2000 lives. The students will be challenged to identify locations in the Houston/Harris County area that are most prone to flooding. For example, students will be shown pictures of roadways that flood easily (such as Highway 288 south of downtown, a segment of North Main Street under a bridge, the Katy Freeway near 610, buildings and parking garages underground - such as in downtown Houston and even at the University of Houston, etc.).

The students will also explore how human modification of the environment (construction and population growth, for example) has affected the risk for flooding in the Houston area.

### **Lesson 9: Choices, Choices, Choices for Team and/or Individual Explorations**

In this very extensive lesson students will select a topic for small group/individual investigation. The possible choices include visiting storm water detention/retention basins in our area and preparing documentation in the form of photograph collections or video clips, interviewing senior citizens about their experiences with flooding in our area over the years (using a tape recorder or video camera - with questions that have been pre-approved by the teacher), building a model dam that would demonstrate some of the problems relating to the Johnstown, PA Flood, prepare a play, PowerPoint, or video to explain how to prepare for flooding, research and report about the flooding that has been experienced in the past and the lessons learned (such as the Galveston Hurricane of 1900, for example), preparing a newspaper or other document, and many other possibilities. This lesson will take several class periods (and in many cases quite a bit of outside work) to complete.

The students will relate their findings in a wide variety of optional manners. The completed projects will then be showcased to other students. Parents will also be invited to attend one of these presentations.

### **LESSON 10 – Fun and Review!**

A fellow teacher and I have created a Jeopardy-style game by using PowerPoint. We did not use any templates; we created it step-by-step from slide 1 and prepared our own categories, questions, and answers. During this unit, I will have my students submit questions and answers for inclusion in this exciting game. Playing the game will provide a great way to review and the thrill of competition! Small prizes (such as award pencils and stickers) will be provided to all the participants. Additional recognition will be provided to the students who submitted good questions and answers.



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These web pages provide information regarding what to do before and after floods. It also has some good links to historical flood and flood related events and risk reduction programs and activities.
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This book is considered as one of the best sources of accurate information about the Johnstown Flood.
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This children’s book tells about how a young girl became a heroine by keeping a lighthouse going during a fierce storm in January of 1856 in Matinicus Rock, Maine. It is also the topic of a *Reading Rainbow* video that is available through the Houston Public Library System.
- Sandler, Martin W. *America’s Great Disasters*. New York: Harpercollins Publishers, 2003.  
This wonderful book presents photographs and information about about several major disasters, ranging from the Johnstown Flood to the recent eruption of Mount St. Helens. It presents a few pages about each of the disasters and appeals to adults and children of all ages.
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This extensive web site contains information about natural hazards and natural resources. There is a huge collection of pictures and real-time water flow data. The specific real-time stream water flow data is located at <[http://waterdata.usgs.gov/nwis/current/?type=flow&group\\_key=state\\_cd](http://waterdata.usgs.gov/nwis/current/?type=flow&group_key=state_cd)>. The data is selected by state, and then by local monitoring point. There are several reporting points for Houston.
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### Books for Teachers and Students

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This book has lots of interesting hands-on science experiments that students can complete with ordinary materials. It also has considerable background information about the topics covered. It is a continuation of the book listed below.

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This wonderful book presents photographs and information about about several major disasters, ranging from the Johnstown Flood to the recent eruption of Mount St. Helens. It presents a few pages about each of the disasters and appeals to adults and children of all ages.

### Books for Teachers

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This historical science book is based on the actual diaries of Isaac Monroe Cline and contemporary accounts of the Great Hurricane of 1900 that hit Galveston, TX on September 8, 1900. This hurricane, which remains the greatest natural disaster in American history, destroyed almost all of Galveston and killed over 6000 people.

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Morton, Robert A., and Asbury H. Sallenger, Jr. *Earth Inquiry, Coastal Hazard, Severe Storms and Rising Seas*. New York: W.H. Freeman and Company, 2004.

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Ridky, Robert W. *Earth Inquiry, Recurrence Interval of Floods*. New York: W.H.Freeman and Company, 2002.

This paperback book, published in conjunction with the American Geological Institute, addresses how a frequency magnitude approach is useful for analyzing the recurrence probability of many science as well as social science

events. A specific case study is presented in order to relate how informed judgments about the risk for future flooding for St. Genevieve, Missouri (based on the 1993 flooding along the Mississippi River), can be determined.

### **Books for Students**

Burton, Jane, and Kim Taylor. *The Nature and Science of Rain*. Milwaukee: Gareth Stevens Publishing, 1997.

This basic book about the nature of water also presents the water cycle and some simple experiments with water. It appeals greatly to K-2<sup>nd</sup> graders, but third-graders can also appreciate it in terms of review and/or remediation.

Cole, Joanna. *The Magic School Bus Inside a Hurricane*. New York: Scholastic, 1995.

This is typical of the various Magic School Bus series. It appeals greatly to intermediate students and does contain an extensive amount of interesting information about the life of a hurricane.

Parker, Janice. *The Science of Weather*. Milwaukee: Gareth Stevens Publishing, 2000. Although this book is filled with interesting information. For example, it explains regional weather patterns (climates), explains why we have seasons, has unusual puzzles, and has some good illustrations.

Powell, Jillian. *Rain and Us*. Mankato, MN: Smart Apple Media, 1999.

This very basic book covers the essential of rain (even including a two interesting pages about rain worship). This book appeals greatly to K-2<sup>nd</sup> grade students, but it can also serve as a quick review for 3<sup>rd</sup> graders.

Rogers, Lisa W. *The Great Storm*. Lubbock, TX: Texas Tech University Press, 2002.

This historical fiction diary appeals to students in upper elementary and middle schools. This book is based on extensive primary-source research and contains photos and a map.

Sherman, Josepha. *Splash! Splash! A Book about Rain*. Minneapolis: Picture Window Books, 1994.

This early childhood book is a good introduction to the nature of water and rain. It has very simple artwork that work well with the text. This book appeals to PreK-1<sup>st</sup> graders.

Simon, Seymour. *Hurricanes*. New York: HarperCollins, 2003.

Another fine book by Seymour Simon, this one gives basic information about hurricanes with lots of colorful illustrations. This book appeals to elementary students of all ages.

---. *Tornadoes*. New York: Morrow Junior Books, 1999.

This is another fine book by Seymour Simon. This one addresses the topic of tornadoes in ways that appeal to all levels of elementary students. The photographs are excellent, as is the text.

---. *Weather*. New York: Morrow Junior Books, 1993.

This interesting book, with its many colorful pictures, targets young elementary students. It gives basic information about clouds, smog, and weather events.

Souza, D.M. *Hurricanes*. Minneapolis: Carolrhoda Books, Inc., 1996.

This basic book about hurricanes targets young elementary students. This book has many illustrations and a glossary that is useful.

Willis, Susan and Steven Willis. *Meteorology: Predicting the Weather*. Minneapolis: The Oliver Press, Inc., 2004.

This very comprehensive book explains (to upper elementary and middle school students, especially) how scientists predict the weather. Information ranges from myths to recent storm chasers.